RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
235 Promenade Street, Providence, Rhode Island 02908

Environmental Fact Sheet

Wastewater Disposal Guidance for Breweries, Wineries & Distilleries

INTRODUCTION:

Breweries and related facilities (e.g., distilleries and wineries) produce high strength process wastewater, depending upon production methods and pollution prevention practices used at the facility. According to the October 13, 2016 Rhode Island Water Quality Management Plan, approximately 70% of the Rhode Islanders rely on public sewer systems to handle wastewater flows. Wastewater disposed of by discharging to a sanitary sewer is treated at a Wastewater Treatment Facility (WWTF). While brewery/distillery/winery wastewaters are generally not "toxic" per federal regulations, if discharged without proper pollution prevention practices, they can damage and/or inhibit the biological process of publicly owned WWTF's. If a WWTF is not functioning properly, significant public health impacts can occur (gastrointestinal illnesses, beach closures, algal blooms, fish kills, etc.).

Federal law (40 CFR 403.5) allows for fines to be levied upon any sewer User that "introduces any pollutant(s) which cause Pass Through or Interference."

All WWTFs are issued a Rhode Island Pollutant Discharge Elimination System (RIPDES) permit by RIDEM. The RIPDES permit establishes limits on the pollutants that can be discharged that vary based on the waterbody they discharge to. Areas that are not sewered rely on On-site Wastewater Treatment Systems (OWTSs), commonly called septic systems, for wastewater disposal. For all OWTSs, RIDEM is responsible for reviewing applications and issuing permits.

The following municipalities are sewered or have a portion of the community that is sewered: Barrington, Bristol, Burrillville, Coventry, Cranston, Cumberland, East Greenwich, East Providence, Jamestown, Johnston, Lincoln, Middletown, Narragansett, New Shoreham, Newport, North Kingstown, North Providence, North Smithfield, Pawtucket, Providence, Scituate, Smithfield, South Kingstown, Warren, Warwick, West Greenwich, West Warwick, Westerly, Woonsocket (See Table 1 for a list of

municipalities served by each WWTF and the WWTF's phone number). All of these municipalities, except Burrillville, Jamestown, Narragansett, and New Shoreham, discharge to WWTFs that have an approved Industrial Pretreatment Program (IPP). For those communities with approved IPPs, the local sewer authority is the "Control Authority" which is responsible for permitting discharges to the sewer from Significant Industrial Users (SIUs) and ensuring that local sewer limits are met. If you are located in one of these communities, questions regarding whether your building is served by sewers and permitting requirements should be directed to the local community or sewer authority. For the 4 communities without approved IPP programs (e.g., Burrillville, Jamestown, Narragansett, and New Shoreham), RIDEM is the Control Authority and works with the local Municipality to make sure that SIU wastewater is properly treated and meets the requirements of the WWTFs. Any questions regarding permitting requirements for these 4 communities should be directed to DEM at 401-222-4700, extension 7228.

The wastewater generated from breweries, distilleries and wineries can cause problems for WWTFs or OWTSs since it typically has high-strength Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS), wide pH swings, high temperatures, and slug loading from batch discharges. These wastewater discharges, if not properly regulated and controlled, can result in: failure of OWTSs and upsets to WWTF's treatment process, violations of the WWTF's RIPDES permit's limits, as well as a loss of a disproportionate amount of biological treatment capacity, resulting in an increase in process upsets and operational costs.

This Fact Sheet provides an overview of the wastewater disposal options and the Best Management Practices that these facilities should employ to minimize wastewater impacts. RIDEM has a separate Fact Sheet that discussed how Industrial Pretreatment Programs (IPPs) should regulate these types of discharges.

DISPOSAL OPTIONS:

Discharges to OWTSs:

The discharge of wastewater generated from breweries, distilleries and wineries can cause problems for OWTSs due to high strength BOD and TSS, a wide range of pH swings, high temperature and slug loading from batch discharges. To minimize any of these problems, these high strength waste streams should be segregated from domestic wastewater (i.e., wastewater from restrooms and handwash sinks) and discharged to a RIDEM approved holding tank for off-site disposal. The spent yeast slurry, grains and hops should be collected for offsite composting or for any other beneficial use (see "solids management" below). Another option for wastewater disposal/treatment is to pretreat this wastewater to domestic waste standards and strength prior to discharge to an OWTS. An OWTS permit is required for either of these disposal options.

Hauling Wastewater to a RI WWTF:

WWTFs in RI generally do not have a program for accepting hauled wastewater or septage (solids from OWTSs) that are not domestic in nature (i.e., that are not generated by a residential building). The exception is the Cranston WWTF which has established DEM-approved procedures. Cranston evaluates the acceptance of hauled non-domestic wastewater on a case-by-case basis. Contact your local WWTF for its specific hauled wastewater policy.

Discharges to a Sewer/WWTF:

1. Obtain a Permit and comply with discharge limits:

   If you discharge to a sewer/WWTF, you should have a Permit Pre-Application Meeting with the WWTF. You may be required to obtain an Industrial Wastewater Discharge Permit from your local municipality/RIDEM and may be classified as a Significant Industrial User (SIU). All breweries that send their wastewater to the sewer system must ensure their wastewater meets local sewer discharge limits and prohibitions. Each WWTF has different limits and requirements.

   - BOD: Breweries typically discharge very high levels of BOD (e.g., 10,000 - 20,000 mg/l or higher). Such high strength BOD discharges would require treatment to meet the sewer discharge limits. See Table 1 for a list of BOD and TSS limits in RI that would apply to Breweries that discharge to a sewer, and contact your local WWTF to apply for a Discharge Permit and to also determine what other limits and requirements apply.

   - Total Suspended Solids (TSS): Solids such as spent yeast, grains, hops and trub capable of settling can restrict or block flow in sewer lines. A facility that discharges solids which cause a sewage backup is liable for any damages.

   - pH: The pH of wastewater must typically remain between 5.0 and 12.5 (check with your WWTF for specific limits). Wastewater that is too acidic (low pH) or too alkaline (high pH) can seriously corrode the sewer system and affect the wastewater treatment facility's ability to treat the wastewater, so the pH must be controlled.

   - Temperature: High temperature brewery wastewater can cause issues at wastewater treatment plants. Check with your WWTF for limits.

Table 1

WWTF (Phone Number)	*Municipalities Served*	*BOD/CBOD (mg/L)*	*TSS (mg/L)*
Bristol (401-253-8877)	Bristol	4,000	4,000
Burrillville ** (401-568-9463)	Burrillville	300/500	300/500
Cranston * (401-467-7210)	Cranston Johnston	25 lbs/day	None
East Greenwich *** (401-886-8649)	East Greenwich	None Surcharge >300	None Surcharge >375
East Providence *** (401-433-6363)	Barrington East Providence	None	None
Jamestown ** (401-423-7295)	Jamestown	Unusual Conc's/Significant Load	
Narragansett ** (401-782-0682)	Narragansett	250/1,000	250/1,000
New Shoreham ** (401-466-2027)	New Shoreham	200	200
NBC Bucklin Point (401-461-8848 x-490)	Central Falls Cumberland East Providence Lincoln Pawtucket Smithfield	TBD	TBD
NBC Field's Point (401-461-8848 x-490)	Cranston Johnston Lincoln North Providence Providence	TBD	TBD
Newport (401-846-2321)	Newport Middletown	200 lbs/day	1,000
Quonset (401-294-6342)	North Kingstown	300	300
South Kingstown (401-789-9331)	Narragansett South Kingstown	519	None
Smithfield * (401-231-1506)	Smithfield	350	400 lbs/day
Warren (401-245-8326)	Warren	4,000	4,000
Warwick (401-739-4949)	Warwick	800 lbs/day	1,000
Westerly *** (401-596-2847)	Westerly	None	None
West Warwick (401-822-9228)	Coventry Cranston Warwick West Greenwich West Warwick Scituate	2,000	2,000
Woonsocket * (401-762=5050)	North Smithfield Woonsocket	500	300

* These WWTFs have mass-based limits not shown above that apply to certain IUs/SICs

** These 4 WWTFs do not have a RIDEM-approved Industrial Pretreatment Programs, so RIDEM is the Control Authority for permitting and enforcement of federal and state pretreatment program requirements. Questions regarding whether or not the facility is served by sewers should be directed to the WWTF. Permitting questions should be directed to RIDEM at 401-222-4700, extension 7228

*** WWTFs with no current BOD/TSS local limits are encouraged to develop such limits before accepting high strength discharges.

2. Install a monitoring point:

   To ensure their wastewater meets requirements, breweries must have an accessible monitoring point. They must be able to collect samples that represent the discharge from the brewing operation in a location that is separate from sanitary and/or restaurant drains. While small breweries may not always have a separate monitoring point, the municipality reserves the authority to require one and it is generally recommended. It's better to plan ahead for growth, rather than incur the cost of remodeling and upgrading plumbing. A sampling/monitoring point is needed to sample brewery wastewater only, not other sources of wastewater such as sanitary wastewater (e.g., wastewater from restrooms).

BMPs TO REDUCE POLLUTANTS IN WASTEWATER:

To help breweries, and related facilities, meet wastewater disposal requirements and manage costs, the following BMPs should be used to minimize pollutants discharged. Readers may also find the following publication helpful: Brewers Association's Water and Wastewater: Treatment/Volume Reduction Manual https://www.brewersassociation.org/attachments/0001/1517/Sustainability_-_Water_Wastewater.pdf).

1. Solids management

Tips for limiting suspended solids:

- Install screens, filters or baskets on all floor drains and trenches to capture solids.
- Prevent spent yeast, grains, hops, and trub from entering the sewer. Collect them from all filters, mash tuns, whirlpools, and kettles by settling, straining, screening or filtering them. Prevent them from entering the sanitary sewer.
- Use the correct gauge screen to maximize solids removal and install screens that are easy to access and service.
- Dewater collected solids and dispose off-site. Consider beneficial reuse (farms).

- Collect spent yeast slurry for offsite disposal or beneficial reuse. If possible reuse the yeast for multiple generations. This is important because spent yeast slurry from fermentation/maturation tanks has high nutrient and high solids content. Large quantities of yeast lead to organic acids formation, which affects the pH (makes the wastewater more acidic).
- Collect used filter media (e.g. diatomaceous earth) and dispose off-site or consider beneficial reuse.
- Control solids at the source for offsite disposal, don't let the solids into floor drains/trenches, sweep up and collect spills, and avoid rinsing solids down the drain.
- Train employees on solids management practices.

Beneficial reuse

When disposing solids offsite, consider beneficial reuse. Seek opportunities to turn your solids and high strength waste into compost, fertilizer, animal feed, energy, or other authorized beneficial reuse. For specific recommendations regarding solids management, refer to the separate fact sheet titled *"2019 Brewery Fact Sheet on solids separation, removal and management".*

2. Control Wastewater pH

In general, brewery wastewater is acidic. However, cleaning processes can cause high and low spikes. Brewery operations must maintain compliance with pH discharge limits.

Tips for maintaining compliance with the pH limits:

- Install totes, tanks or containers to adjust the pH of individual waste streams.
- Install a sufficiently sized tank to collect wastewater from all brewery operations for the purpose of self-neutralization and if necessary to adjust the pH to meet these limits.
- For small batches with slight excursions above upper pH limits, mild acids such as acetic acid (i.e., vinegar) or citric acid can be used to neutralize the wastewater.
- For small batches with slight excursions below lower pH limits, mild alkaline solutions, such as calcium carbonate (lime) can be used to neutralize the wastewater.
- Stronger acidic or alkaline neutralization chemicals may be needed based on the pH and the volume of the wastewater to be neutralized.
- Provide a mechanical mixer in the wastewater tank to make sure adequate mixing occurs when using neutralizing chemicals.
- Reuse and recycle chemicals wherever possible through automated approaches (e.g., clean in place).
- Train employees on pH management practices.

3. Product losses/off-spec product

Sending excessive amounts of high strength waste to the sewer can disrupt the sewer system and/or increase your high strength surcharge fees. Minimize the volume of unused and off-spec product discharged to the public sewer whenever possible. If there is no other alternative than the sewer, the discharge still must meet local limits. In addition to collecting spent yeast, grains, hops and trub, collect the following high strength wastes and dispose off-site if possible. Consider beneficial reuse for disposal:

• Off-spec and unused product.

• Tank heels and initial rinse of brew tanks.

• Beer & yeast lost in racking and transfer.

• Beer lost in filtering, bottling, & kegging.

4. Chemical storage and spill prevention

Provide secondary containment for chemical solutions such as cleaning and sterilization chemicals and waste materials to prevent the entry of these materials into the sewage system in case of accidental spills. Reduce use of toxic chemicals whenever possible.

• Store chemical solutions in low traffic areas, away from forklifts and other production activities, to lessen the chance of an accidental spill.

• Segregate and securely store non-compatible chemicals (for example acids and bases) in separate containment areas to prevent mixing of incompatible or reactive materials.

• Maintain and inspect all process solution tanks on a regular basis and repair any leaks promptly.

• Label all chemical solution storage containers.

• Develop a spill response plan and train employees to follow the spill plan. Post the spill plan and the contact information for spill notification in a prominent place. The plan should at a minimum:

o Describe where chemicals are stored, how liquids are stored and handled to prevent and isolate spills, and transfer protocols.

o Describe how staff will respond to a spill, including immediate notifications to emergency responders.

o Describe staff training required to respond to spills safely and effectively.

o Update the plan as your processes change.

5. Water Conservation

Conserving water can reduce wastewater and save money. Ways to conserve water include:

- Monitor your water usage by installing water meters in various areas of the operation; establish a baseline and set water saving goals.
- Use dry clean-up procedures prior to wet clean-up.
- Use water-efficient equipment, such as high-pressure nozzles, clean-in-place systems, and water brooms. Find alternatives to water-cooled chilling equipment.

Additional examples of water conservation BMPs can be found in such documents as the Brewers Association's Water and Wastewater: Treatment/Volume Reduction Manual (https://www.brewersassociation.org/attachments/0001/1517/Sustainability_-_Water_Wastewater.pdf).

Record Keeping:

Facilities must keep records to document the facility's compliance with requirements.

- Maintain records documenting off-site waste removal including waste stream, volume, date, and method of disposal of accumulated wastes.
- Maintain records of all effluent sample results collected to determine compliance with local limits.
- Retain records on site in accordance with your IPP/OWTS permit requirements.

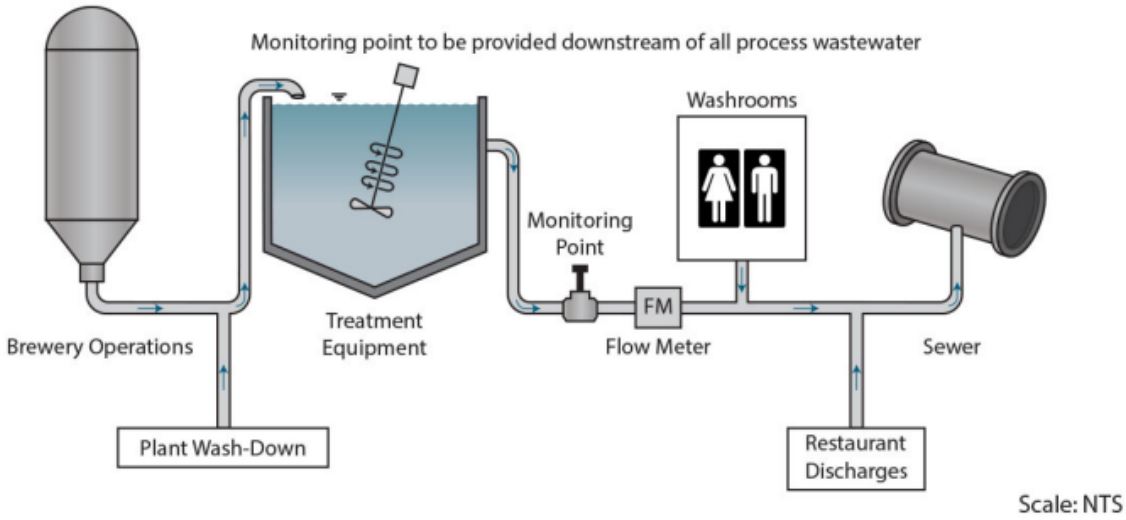
Considerations for new or remodeled operations:

Avoid expensive mistakes! When working on your facility layout, retain the services of an engineer experienced in design of brewery wastewater treatment systems and consider the following:

- All drains from brewing operations should lead to a common drain, sump or wastewater tank where the wastewater can be accessed and managed to ensure compliance with discharge limits.
- Provide an easily accessible sample site that is representative of the discharge from the brewing operation, separate from sanitary and restaurant drains. See Figure 1. Note: This Figure was originally developed by King County,

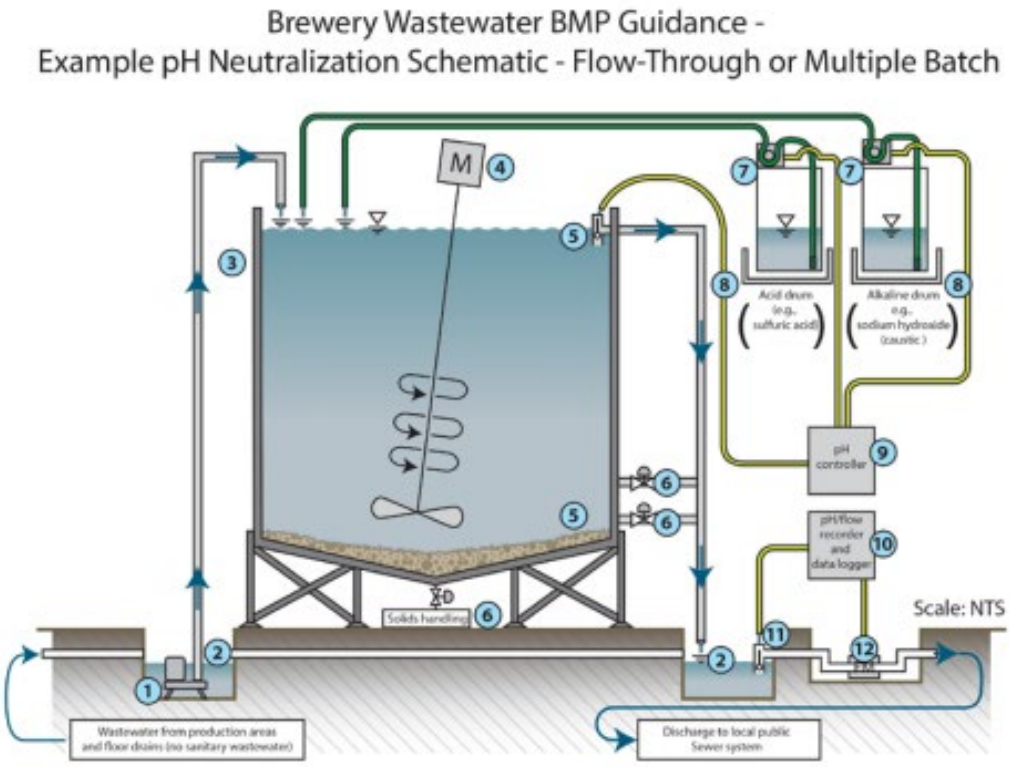
Washington Wastewater Treatment Division.

Figure 1: Monitoring point is needed to sample brewery wastewater only, not other sources of wastewater.



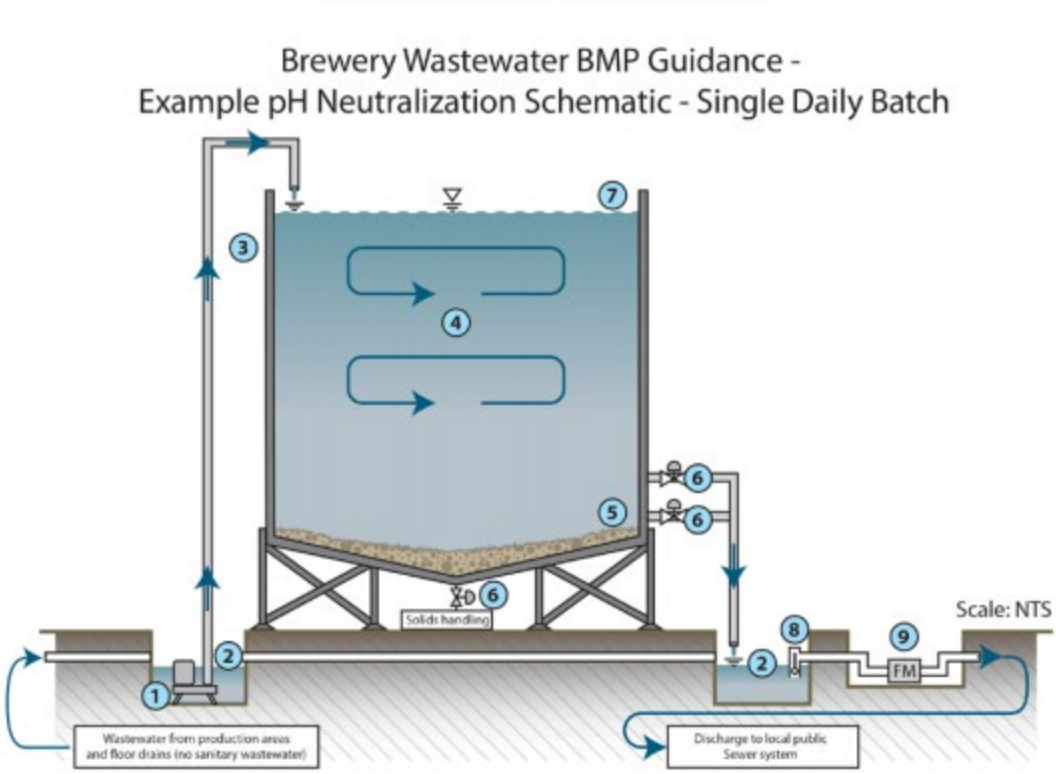
- Control of pH is often necessary, and batch treatment to meet pH limits is still the best option for many small breweries. Necessary features typically include a tank, mixer, pH meter in tank (to control neutralizing chemicals), continuous pH meter (for the discharge), and a delivery system for the acids and bases used for neutralization. (See Figures 2 and 3). Note: These Figures were originally developed by King County, Washington Wastewater Treatment Division.

Figure 2: pH neutralization for flow-through or multiple batch



1. Sump pump(s) with level controls set to prevent gravity overflow through the sewer outlet under peak flow conditions from the production area. Check valve and flow control valve not shown.
2. Sump or lift station with protective grating.
3. Tank for self-neutralizing of acidic and alkaline industrial wastewater and for adjusting pH by addition of concentrated neutralizing chemicals. Conical tank with stand shown. A flat-bottom tank can be used as well, but solids handling is a bit more labor-intensive. The piping and valving shown allows for the tank to be operated in flow-through mode through the upper overflow line or in batch decant mode through the lower decant lines.
4. Mechanical mixer with impeller or propeller blades to facilitate the neutralizing of acidic and alkaline industrial wastewaters. Mixer should be set at a slight angle and sized to turnover the tank volume at least a few times within the hydraulic retention time. Mixer mounting not shown to provide clarity to the schematic and as styles vary.
5. Controlling pH probe used, along with the pH controller (9), to regulate the delivery of neutralizing chemicals to the tank. The controlling pH probe can be moved to other locations within the tank based on the particular tank geometry and experience with what works best for stable pH control. For discharges in batch mode, the controlling pH probe needs to be a located where it can be constantly submerged.
6. Valves in a normally-closed position. Side decant valves to be opened when decanting the neutralized and clarified tank wastewater in batch decant mode. Tank bottom valve to be opened for removal of settled solids or for tank cleaning.
7. Chemical metering pump integrated with the controlling pH probe (5) through the pH controller (9). pH setpoints established to deliver acidic or alkaline concentrated neutralizing chemicals with a sufficient safety factor to ensure that the discharge pH probe (11) remains within local discharge limits.
8. Separate secondary containment for the concentrated acid and alkaline neutralizing chemicals.
9. pH controller integrated with the controlling pH probe (5) and chemical metering pumps (7).
10. pH and flow recorder and datalogger connected to the discharge pH probe (11) and flow meter (12) to monitor the pH and volume of the industrial wastewater discharged to the sanitary sewer. Any sanitary wastewater (e.g., restrooms, etc.) must enter downstream from the discharge pH probe (11) and flow meter (12).
11. Discharge pH probe positioned in a vented "T" to allow for ease of access and to remain constantly submerged.
12. Flow meter in valve box or other suitable structure with protective grating. The meter is to be installed per manufacturer's instructions and have datalogging capability. Ability for the flow meter to integrate with an autosampler to collect flow-proportioned samples also may be required for large volume dischargers.

Figure 3: pH neutralization for a single daily batch



1. Sump pump(s) with level controls set to prevent gravity overflow through the sewer outlet under peak flow conditions from the production area. Check valve and flow control valve not shown.
2. Sump or lift station with protective grating.
3. Tank for self-neutralizing of acidic and alkaline industrial wastewater and for adjusting pH by addition of concentrated neutralizing chemicals. Wastewater to be collected for an entire workday to allow for batch treatment and discharge at the end of the workday. Conical tank with stand shown. A flat-bottom tank can be used as well, but solids handling is a bit more labor-intensive. The piping and valving shown allows for the tank to be operated in batch decant mode through the lower decant lines.
4. Use a mechanical mixer or hand paddle (for small tanks) to facilitate the neutralizing of acidic and alkaline industrial wastewaters.
5. Test wastewater batch with a pH probe to regulate the delivery of neutralizing chemicals to the tank. The pH probe needs to be a located where it can be constantly submerged.
6. Valves in a normally-closed position. Side decant valves to be opened when decanting the neutralized and clarified tank wastewater in batch decant mode. Tank bottom valve to be opened for removal of settled solids or for tank cleaning.
7. Neutralizing chemicals to be added manually or with aid of a chemical metering pump.
8. Discharge pH probe positioned in a vented "T" to allow for ease of access and to remain constantly submerged during batch discharge.
9. Flow meter in valve box or other suitable structure with protective grating. The meter is to be installed per manufacturer's instructions and have datalogging capability.

- Set aside sufficient floor space for a wastewater pH equalization/treatment tank, treatment chemical containers, and solids handling equipment and storage.
- Consider the method(s) and/or equipment you will use to measure wastewater discharge volume from the brewing operation.

Additional Information:

For additional information regarding the discharge of Brewery, Winery, and Distillery wastewater to sewer systems, contact the appropriate WWTF mentioned in Table 1 or for discharges to the Burrillville, Jamestown, New Shoreham, and Narragansett sewers contact DEM at 401-222-4700, extension 7228.

For additional information regarding the discharge of Brewery, Winery, and Distillery wastewater to OWTS, contact the RIDEM's OWTS Program at 401-222-3961.

For additional information regarding the beneficial reuse of Brewery, Winery, and Distillery solids, contact the RIDEM's Office of Customer and Technical Assistance at 401-222-6822.